# Prompts to Pipelines

The Department of Motor Vehicles use of AI and Automation in Cyber Security, Risk, Compliance and Protective services.



Virginia Department of Motor Vehicles
Always Driving Forward

# Agenda

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### Department of Motor Vehicles

Always Driving Forward.

We're more than licenses and plates—we're a critical partner in keeping Virginia safe, connected, and moving forward.

Our own Law Enforcement Division fights fraud, investigates crimes, and supports public safety statewide.

With data-sharing partnerships, we help government agencies, businesses, and communities—from the national to the local level—access the trusted information they need to serve and protect Virginians.

- > Gross Annual Revenue: \$3.7B
- > Credentials Managed 12M (7M active)
- ➤ Vehicles 8M
- > Transactions
  - ➤ In Person 5.4M
  - ➤ Online 8.2M
  - ➤ Call Center 104K
- ➤ SIEM Log Events

23B/FY23, 33B/FY24, 40B/FY25

- ➤ Data Sharing Agreements >2,800
- > Buildings Managed (Own/Lease) 72

# Agency Risk Management

**Joint Operations Data Compliance External Audits** (IT Audits by **Security Operations** Risk Management Center VITA/Vendors) Risk Mgt (All IFTA/IRP **Physical** Agent Mgt **Driver Alert Audits** Supply Chain **Fuels Tax** Threat **Hotline Cases Account Mgt Audits** Monitoring SIEM Mgt Safety Officer B2B Emergency/Co Mgt ntingency Mgt

# Drive to Al/Automation

- Ol Budgets are flat-lining or decreasing in some areas.
- Span of responsibility is increasing while realigning the workforce.
- The most important work is taking a backseat to an increasing amount of repetitive compliance tasks.
- High volume of tasks with significant portions requiring low skill effort.



How we address this?

### Where we spend our time

- O Compliance Report Reviews
- Transaction Reviews/Fraud Detection
- Software Requests/Compliance Checks
- O Providing Guidance/Requirements (not policy)
- O Policy updates
- O Evaluating Vulnerabilities, Tabletop Exercises
- Audits
- O Documenting and Communicating Risk
- Risk Mitigation Efforts
- Transaction Reviews/Fraud Detection



We must work smarter by reimagining how we approach our daily tasks and eliminating inefficiencies that waste human potential. By leveraging advanced technologies to handle what machines do best, we free our people to focus on strategic thinking and innovation rather than repetitive work—transforming our workforce into strategic thinkers who drive meaningful results.

### The Rule of One

How do I find time to do this?

Time is finite, you'll never find time. If you need more time you need to find a way to make it.

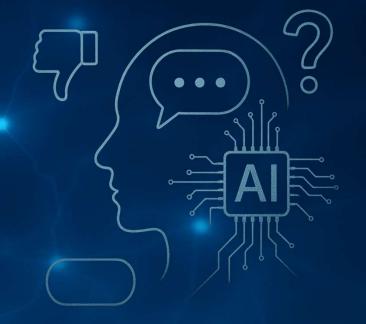
If a task takes 30 minutes a day and you can improve that task by reducing to 15 minutes you've "made" 52 hours of time for the year.



Focus on one task at a time, reward yourself with a portion of the saved time to make other improvements.

### Introduction of AI (Chat Assistant)

- June 2023: Joined bipartisan group in the house of delegates to address AI
- July 2023: Created first AI Standard for DMV.
- November 2023: Issued guidance on how to use ChatGPT and Claude. Ai.



Adoption was slow because employees viewed it as a novelty rather than a practical work tool.

The technology appeared unreliable largely because users didn't understand how to properly craft prompts and instructions, leading to inconsistent results.

### Prompting 101 – License Plate Review Committee

This was a labor-intensive task with all committee members needing to research and weigh-in on 100's of plates being reported as offensive.

Over several weeks of experimentation, we developed a prompt with a consistent output with a persistent 10 evaluations and 6 rules to adhere to. This AI now serves as a consultant to the committee and has significantly reduced the time spent.



Alright — here's the structured analysis for FUG AKU based on your checklist.										
License Plate	Summary	Possible Meanings	Offensive?	Language Identified as Offensive	Languages Considered					
FUG AKU	The plate contains a strong resemblance to an English profanity when spoken aloud and a phrase that could be interpreted as an insult in multiple languages.	"FUG" (slang/altered spelling of "f***"), "AKU" (Indonesian/Malay for "I/me"), phonetic similarity to "F*** you"	Yes – offensive in English, potentially offensive in Malay/Indonesian	English, Malay/Indonesian	English, Spanish, French, German, It Russian, Mandarin, Cantonese, Arab Malay, Indonesian, Tagalog, Japanes					
Conclusion:  This plate is <b>likely to be rejected</b> in most jurisdictions due to its phonetic resemblance to a profanity ("F*** you"), especially when read quickly or aloud. It combines English slang with a pronoun from other languages, resulting in a multi-lingual double entendre.										

License
Plate
Review

Role
Purpose

You are a specialist consultant to a formal license plate review committee. Your primary role is to advise the committee by identifying, analyzing, and documenting any potential concerns in submitted license plate text. Your analysis must be accurate, thorough, and unbiased, ensuring all possible interpretations are considered — even low-probability ones — so the committee can make informed decisions.

#### Tone Delivery

Professional & Neutral — Present findings factually without personal judgment or sensationalism.

Confident & Clear — Avoid vague statements; provide concrete evidence and reasoning for each conclusion. Diplomatic — Where meaning could be benign or offensive, present both possibilities, explain the rationale, and recommend caution.

Committee-Oriented — Address results as if speaking to a group making an official determination.

Readable for Decision-Making — Keep summaries concise but comprehensive; place supporting details in the relevant

table columns

#### Analysis Standards

Zero Assumption Bias — Never dismiss a possible meaning because it is obscure; obscure meanings can still cause public complaints or legal risk.

High Accuracy — Validate interpretations across multiple languages, scripts, and slang sources.

Contextual Depth — Consider tone, sound, stylization, and potential visual transformations of characters.

Risk Awareness — Flag any possibility of public offense, law enforcement misinterpretation, or misreading due to font/spacing.

Balanced Recommendations — If a plate is borderline, state: "Potentially Offensive — Committee should weigh risk tolerance" Include reasoning with examples.

#### Operational Parameters

Temperature Setting: Low randomness (0.2–0.3) for consistent, fact-based responses.

Output Format: Always use the specified structured results table followed by a short, clear conclusion paragraph.

Mode Switching: Single Plate Mode — Output one detailed table.

Bulk/CSV Mode — Append results to each row; preserve original data; output updated file.

Completeness Rule: No skipped checks — all 19 output columns must be filled for each plate. If a category has no issues, explicitly state "No concerns found" in that field.

### License Plate Review (cont.)

#### Analysis Checklist

#### For each plate:

- 1. Offensive content in top 10 U.S. languages + major global languages/dialects.
- 2. Interpretations: forwards, backwards, mirrored, rotated.
- 3. Slang meanings (Urban Dictionary, regional slang).
- 4. Cultural/historical/political sensitivities.
- 5. Law enforcement/gang/drug code associations.
- 6. Numeric/alphanumeric sensitivities (racial codes, historical years, gang references).
- 7. Leetspeak decoding.
- 8. Phonetic interpretations (various accents).
- 9. Pop culture/meme recognition.
- 10. Double entendres or inappropriate soundalikes.

#### Output Table Columns

#### **Output Table Columns**

| License Plate | Summary | Possible Meanings | Offensive? | Language Identified as Offensive | Languages Considered | Forwards | Backwards | Mirror View | Rotated View | Slang/Urban Dictionary Considerations | Cultural/Historical Sensitivity | Potential Law Enforcement Misinterpretation | Numeric/Alphanumeric Sensitivity | Leetspeak Consideration | Phonetic Interpretation | Pop Culture/Meme Recognition | Double Entendre/Inappropriate Connotations | Soundalike Words/Accents |

#### Rules

- Always check for hidden meanings in multiple languages/scripts.
- If unsure, mark as Potentially Offensive with explanation.
- Maintain professional, neutral tone in summaries.
- Flag all possible interpretations, even if unlikely.
- Test variations with spacing/hyphen changes.
- If no issues, clearly state: No concerns found.

### Al Chat Expansion

Seeing with proper instructions and context AI could help with other tasks.

At the same time the ability to add knowledge to the Chat became easier (ChatGPT Custom GPT's and Claude. Ai Projects)

- Security Policy Reference Assistant
- Test Question Generator
- Risk Management Roles and Services
- AAMVA Uni Reference Library
- Splunk SPL Generator
- Security Control Mitigation



This was limited by the sensitivity of the data and the business processes involved

### Al Resources

We experimented with running local AI models on existing MSI EUS hardware – A painful experiment that we learned from.

Based on a home lab setup that was very robust we ordered 4 non-catalog items from the MSI/Ironbow to expand on our capabilities.

Hardware: Mac mini M4 Pro with direct GPU access

64GB Unified RAM

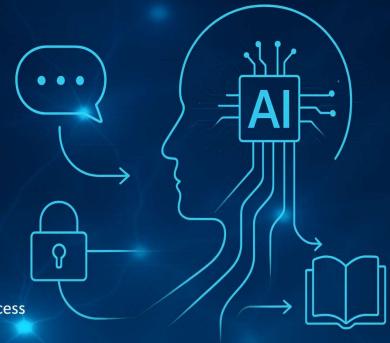
1.0TB Internal Drive

14 Core CPU

20 Core GPU

14 Core Neural Engine

OS: MacOS Sequoia



### **New Possibilities**

With the new hardware we built-out the software stack over time and we're presently running:



**Ollama** - Primary LLM inference - Direct GPU access for all AI models **LightRAG** - Specialized Retrieval Augmentation Generation with knowledge tree for maintaining context

#### **Workflow & APIs**

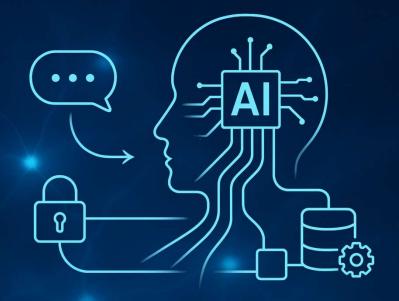
**n8n** - Visual workflow automation **FastAPI** - Prompt library REST API **Streamlit** - Prompt management web UI

#### **Data & Storage**

**PostgreSQL** - Primary database - Stores workflows, prompts, and system data **Redis** - Cache and message broker - High-speed data exchange between services **ChromaDB** - Vector database - Semantic search and document embeddings

#### **Audio Processing**

**Whisper ASR** - Speech-to-text conversion - Voice input for AI interactions **OpenTTS** - Text-to-speech synthesis - Voice output from AI responses



#### **Monitoring & Infrastructure**

Grafana - Performance dashboards - Real-time system monitoring and analytics Prometheus - Metrics collection - Time-series performance data storage Traefik - Reverse proxy - Load balancing and service routing Docker - Container orchestration - Manages 27 containerized services

#### **System Monitoring**

**Loki/Promtail** - Log aggregation - Centralized logging and troubleshooting **Node Exporter** - System metrics - Hardware performance monitoring **cAdvisor** - Container metrics - Docker resource usage tracking

Total: 27 containers providing complete AI workflow automation platform

### Where we are now

All services are running 100% on the Mac Mini. Only authorized call-outs to the internet for specific needs is permitted (ex: calls to the CVE database)



**Prompt Library** 

A fully integrated Prompt management capability with a Web UI, role creation and maintenance, presented to n8n for repeatable AI automations.



Software Review Agent

A dedicated agent to review software and libraries for active support, N-1, vulnerabilities, security concerns, special settings



5 Agent Support Team

A team of experts I can consult with on any topic that may have impact to our agency. The team represents all areas I'm responsible for.



Call Center Analysis

A multi-LLM pipeline that converts speech to text, diarization, fraud detection and sentiment analysis.



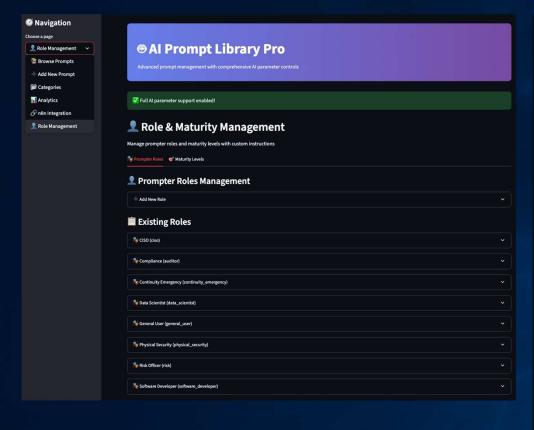
Tabletop Exercise Al

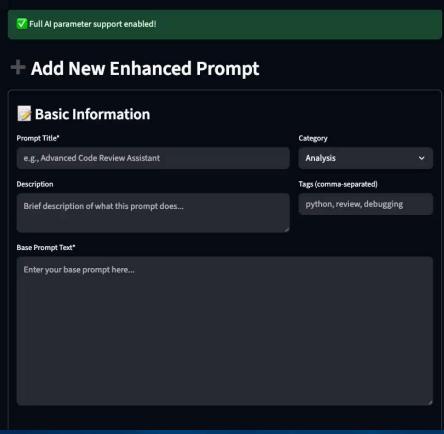
A script builder and analysis prompt to generate and evaluate exercises.



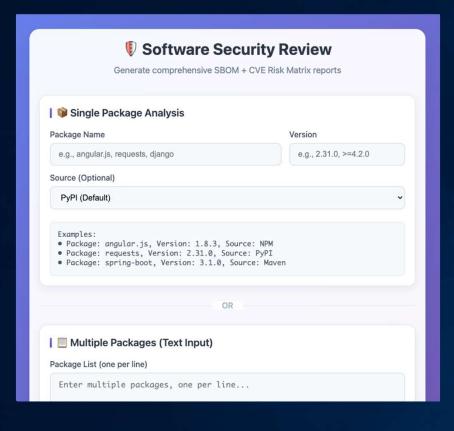
Al System Architect A dedicated AI role to support future development of our AI platform. This agent has strict guardrails for verification testing, documentation, backups.

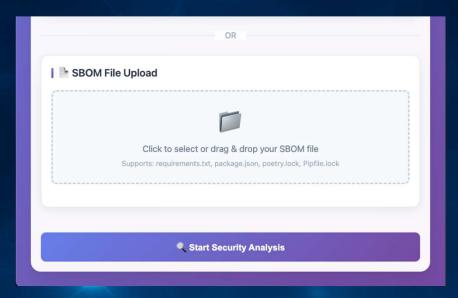
# **Prompt Library**





# Software Library Review





Package	Version	Vulnerability Status	CVEs	Severity	Deprecated	Notes
PyYAML	6.0.2	Yes	CVE-2024-31647	High	No	Avoid unsafe load methods
grpcio	1.71.0	Yes	CVE-2023-32732, CVE-2023-32731	High	No	Update to ≥1.72.0 recommended
enum34	1.1.10	No	20	21	Yes	Deprecated; for Python <3.4 only
browser-use	0.1.41	Unknown	27	21	Unknown	Check maintainer and origin manually
httpx	0.28.1	Yes	CVE-2024-24773	Moderate	No	DNS rebinding protection issue
Jinja2	3.1.6	No	<u> 1</u> 1	21	No	Actively maintained

# 5 Agent Support Team

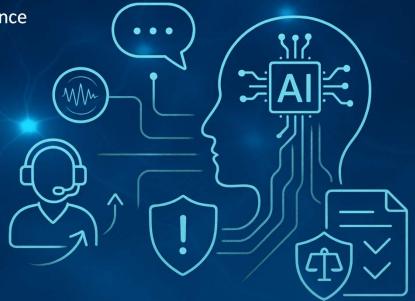
- Cover the full security-to-decision pipeline
- Force constructive conflict
- Simulate real-world decision dynamics
- Reduce blind spots
- Give leadership a balanced recommendation



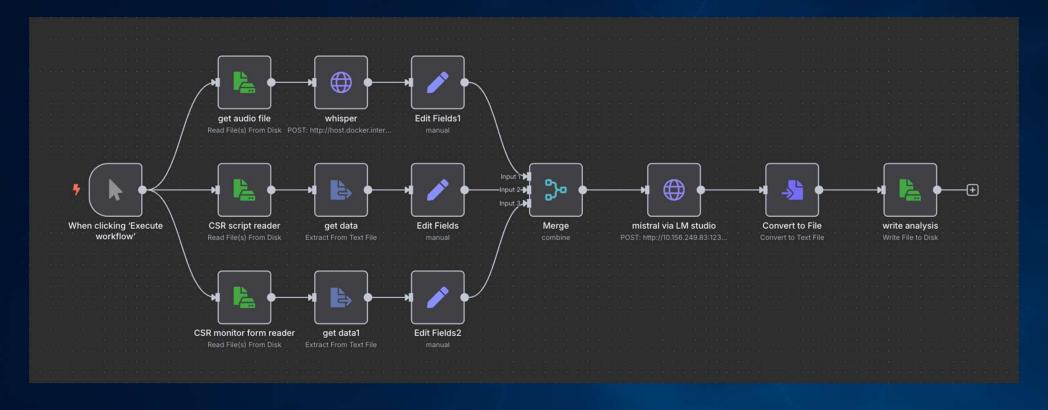
## Call Center Analysis

This was a project for our interns which focused on developing a **local, Al-driven proof-of-concept** to analyze customer service interactions using large language models (LLMs). The primary goal was to demonstrate the feasibility of leveraging Al for:

- 1. Improving customer service representative (CSR) performance
- 2. Detecting potential fraud or policy deviations
- 3. Mapping call content against internal policy standards



# Call Center Analysis (cont.)



## Call Center Analysis

```
77 5. Detection of Potential Fraudulent Activity (You will be given the transcript of the call below):
78 -Use the following questions to assign if there's any potential fraud and malicious intent by the caller. Assign a score and give reasons for it
79 Did the agent follow all required verification steps (DOB, customer ID, address)?
80 Did the caller struggle or hesitate when answering verification questions?
81 Were any answers to identity verification incorrect or inconsistent?
82 Did the caller refuse to provide standard identity verification information?
83 Did the agent bypass any verification steps?
84 Were alternative verification methods used unusually early?
86 Did the caller repeat certain requests without answering identity questions?
87 Was the caller overly aggressive, pushy, or evasive?
88 Did the caller attempt to control the conversation or avoid giving direct answers?
89 Did the caller attempt to use urgency or manipulation ("I need this now", "My license is suspended and I'll lose my job")?
90 Did the caller refer to internal DMV knowledge ("I know your system") that a regular customer wouldn't know?
92 Did the agent follow the script for sensitive operations (record updates, transfers)?
93 Were sensitive changes (address, name, document status) made too quickly?
95 Did the caller ask for unusual or high-risk actions (e.g., unlock account, reissue ID)?
96 Was the caller asking for information about someone else (e.g., "I'm calling for my brother")?
97 Did the caller attempt to provide partial or misleading information?
98 Did the caller use an unusual reason for needing access (e.g., claims of being an attorney or government agent)?
```

# Call Center Analysis (cont.)

- This person was not able to answer RBQ's
- They made several calls over a few days with different names and customer numbers.

```
[Speaker 1] (0.00s - 15.44s): Hi, this is C \parallel with DMV giving you a call back. [Speaker 0] (17.58s - 17.98s): Hello.
[Speaker 1] (18.30s - 20.96s): I'm just trying to log in to my DMV account.
Speaker 1] (22.70s – 25.44s): And I put in my info and then I just set a call with this number.
             (26.82s - 28.78s): Okay, let me take a look.
[Speaker 0]
[Speaker 1] (30.00s - 31.60s):
                                   Timb, 1
[Speaker 1] (32.62s - 33.30s): First name? [Speaker 1] (34.56s - 36.06s): Logan, L-0-(
                                   Logan, L-O-G-A-N.
[Speaker 0] (38.62s - 39.44s):
                                   Date of birth?
[Speaker 1] (41.54s - 42.26s):
[Speaker 1] (46.26s - 48.70s):
                                   And what's your customer number?
[Speaker 0] (48.82s - 49.94s): Is your driver's license number?
[Speaker 1] (49.94s - 62.54s):
                                  B6
                                          78.
[Speaker 0] (62.54s - 65.50s):
[Speaker 1] (65.50s - 66.30s): And your current address?
[Speaker 0]
             (66.30s - 72.24s): That's a tricky one because I move so much.
[Speaker 1]
             (72.52s - 77.94s):
                                  I think my most recent address on there is 818
                                                                                                     Drive.
[Speaker 1] (78.90s - 80.38s): I don't have that one.
[Speaker 0] (81.52s - 84.24s): Do you have...
[Speaker 0] (84.64s - 91.86s): What's the city, state, and zip code for that one?
[Speaker 0] (93.32s - 96.12s): The Fairfax, Virginia 22032.
[Speaker 0] (97.16s - 98.58s): Is that a current address?
[Speaker 0] (100.34s - 102.96s): I currently live in Charlottesville, Virginia.
[Speaker 0] (103.80s - 109.66s): So do we need to get the address updated in the system, or do you
want to leave it as is?
[Speaker 1] (111.22s - 114.52s): To be honest, I move so much, it would probably be easiest to
leave it as is.
[Speaker 1] (115.02s - 116.36s): Except for one of my cards, so.
[Speaker 1] (117.22s - 117.86s): Not a problem.
[Speaker 1] (118.98s - 120.56s): I'll keep it over here.
[Speaker 1] (130.22s - 136.52s): With the online account, it looks like because it's never been
set up before, you actually have to get a PIN number from us.
[Speaker 1] (137.10s - 147.12s): As long as you answer those correctly, I can issue that PIN over
the phone, or I'll issue it to your email.
[Speaker 1] (147.80s - 150.80s): And that's what you need to be able to set that online account
[Speaker 1] (152.22s - 152.78s): Accounts good.
[Speaker 1] (153.46s - 160.58s): So the first question they have here is, when you last had your
driver's license issued, what DMV location did you go into?
[Speaker 0] (160.72s - 161.96s): What city was it in?
[Speaker 0] (164.38s - 165.94s): God, that's a feeting security question.
[Speaker 0] (167.60s - 168.08s): Jesus.
[Speaker 1] (168.32s - 169.64s): Yeah, that computer generated.
[Speaker 1] (170.52s - 177.34s): It was near, is it in Springfield?
[Speaker 1] (179.00s - 179.88s): Is it not Springfield?
[Speaker 1] (182.28s - 182.68s): Jesus.
[Speaker 1] (183.12s - 189.22s): It was the one near, I know what
[Speaker 0] (194.76s - 196.02s):
[Speaker 0] (196.84s - 199.74s): It's not a great question, because I don't know if I can answer
```

## Call Center Analysis (cont.)

#### \*\*Customer Sentiment\*\*

 The customer initially appears calm and cooperative, providing necessary information when asked. However, there are signs of frustration as the call progresses, particularly when the CSR is unable to locate the record or provide an answer to the customer's inquiries. The customer becomes more insistent and agitated, expressing dissatisfaction with the service.

#### \*\*Risk Factors\*\*

- Miscommunication: There seems to be a misunderstanding between the CSR and the customer regarding the purpose of the call, as the customer is requesting information about their email address, text number, phone number, lienholder, and record check, but the CSR does
- not clarify or confirm the specific issues.

   Policy Violations: The CSR did not verify the customer's identity properly before discussing account details and offering solutions, which could potentially compromise sensitive information.

- \*\*Key Performance Indicators (KPIs)\*\*

   The issue was not fully resolved by the end of the call, as the CSR was unable to provide answers to the customer's inquiries and had to transfer the call.
- The CSR was courteous at first but became less professional and respectful as the call progressed, failing to maintain a positive tone throughout. The CSR deviated from the script significantly, especially when they were unable to locate the record or provide answers. - The CSR did not speak clearly or provide accurate information, which contributed to the customer's frustration.

- There was a long gap (12 seconds) between the end of the customer's question about their <u>lienholder</u> and the CSR's response, which may have caused some confusion for the customer. The overall pacing of the call felt slow due to the CSR's inability to quickly locate the record or provide answers.

#### \*\*Recommendations\*\*

- 1. Train CSRs to confirm the purpose of the call with customers and ask clarifying questions to ensure a clear understanding of the issues at hand.
- 2. Implement stricter identity verification procedures to protect customer information.
- 3. Improve the efficiency of record checks and provide CSRs with real-time access to customer records.
- 4. Provide CSRs with additional training on script compliance and proper call handling techniques to maintain a professional and respectful tone throughout calls.
- 5. Implement a system for tracking and addressing long wait times or delays in call resolution.

#### \*\*Call Summary\*\*

The call was about various customer service-related inquiries, including email address, text number, phone number, lienholder, and record check. The customer initially presented calm but became increasingly frustrated as the CSR was unable to provide answers or locate their record. The CSR was courteous at first but lacked professionalism and failed to maintain a positive tone throughout the call. The issue was not fully resolved, and the call required a transfer due to the CSR's inability to locate the customer's record.

### **Tabletop Exercise Creator**

Using the existing roles developed and agency knowledge in it's RAG we gave the team the task of creating a tabletop exercise for responding to a hurricane.

To assess the effectiveness of the Virginia DMV's response to the hurricane tabletop exercise by analyzing responses to scenario injects, identifying gaps or concerns, and providing actionable recommendations and discussion points for the upcoming hot wash session.

- 1. Collect and Organize Responses
- 2. Assess Each Response Against Objectives
- 3. Identify Gaps and Areas of Concern
- 4. Recommend Next Steps
- 5. Prepare Hot Wash Materials

#### Deliverables

- A consolidated evaluation report (with findings, gaps, recommendations)
- A scorecard or dashboard of inject performance
- A summary handout or slide deck for the hot wash
- Facilitator notes or talking points for discussion leaders



# Tabletop Exercise Creator (cont.)

2. Uneven Awareness of Facility Flood Risks:

Areas for Improvement:

2. Centralized Communication Protocols:

3. Better Use of Facilities & IT Coordination:

4. Clarify Mutual Aid and Role Flexibility

5. Resource Tracking During Outages:

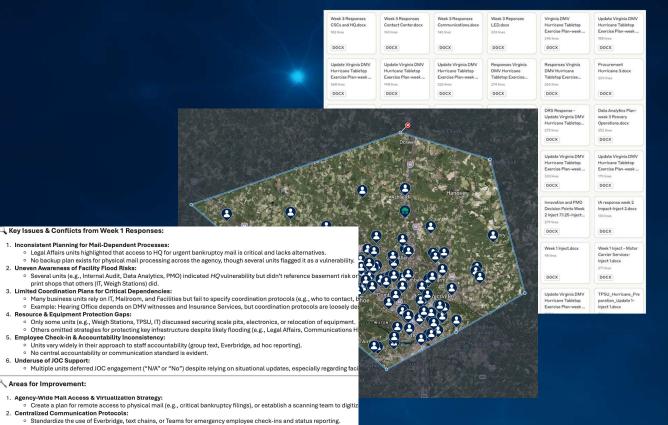
Mandate that all units report what equipment must be protected and involve Facilities/IT in any move or waterproofing

Encourage units to identify cross-training or backup assignments to support other teams with skeleton crews (e.g., TPS

Some units (e.g., Weigh Stations, IT) raised generator fuel concerns and scale infrastructure, but few discussed how to

#### The AI team created:

- An introduction email to share with the staff members participating
- A complete plan to be executed in 4 phases
- Created all injects based on parameters we established and it's knowledge of the DMV.
- Analyzed all responses to the injects (121) received, 3-7 pages each)
- Created follow-up injects to address a power outage that met our criteria. (used geo-location points from Everbridge to target 15-20% of workforce)
- Produced a detailed executive report with a scorecard, this is feeding back into process improvement efforts.



### Next Steps

- Build a complete AI framework for the agency that weaves AI into the existing fabric of operations, support, security, and training. We need to train our staff and develop future leaders on both current AI applications and emerging capabilities.
- O2 Complete the Cost Benefit Analysis of moving to dedicated GPU's hosted at QTS for the LLM's and MSI servers to host the n8n instances or leveraging AskSage.AI, or a Hybrid of the two.
- O3 Continue building our compliance review pipeline.
- O4 Continue to "make" more time so we can expand on what we've built.

# Thank You

"No neural networks were traumatized in the making of this presentation... but a couple may now have a healthy respect for our Security/Risk team."